

PAWTUXET RIVER BASIN
SCITUATE, RHODE ISLAND

MOSWANSICUT POND DAM
RI 03002

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

OCTOBER, 1980

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October 1980

2. REPORT TYPE

Inspection Report

3. DATES COVERED (From - To)**4. TITLE AND SUBTITLE**

RI-03002

Moswansicut Pond Dam

National Program for Inspection of Non-Federal Dams

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U.S. Army Corps of Engineers, New England Division

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New England Division

424 Trapelo Road

Waltham, MA 02254

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424 Trapelo Road

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13. SUPPLEMENTARY NOTES

Cover program reads: Phase I inspection report National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams

14. ABSTRACT

Moswansicut Pond Dam is located on Moswansicut Brook within the Scituate Reservoir Watershed in the Towns of Scituate and Johnston, Providence County, Rhode Island, approximately 3,500 feet from the center of the village of North Scituate. Coordinates of the dam are approximately 41 degrees 50.5' N Latitude and 71 degrees 35' W Longitude. The dam impounds runoff from a drainage area of 3.9 square miles of moderately sloped terrain. The axis of the dam is oriented in a north-south alignment with the reservoir located to the east of the dam. Moswansicut Pond Dam flows into Moswansicut Brook which leads to the main body of the Scituate Reservoir located 4000 feet downstream.

Moswansicut Pond Dam has an impoundment capacity at the top of the dam (El. 309.3 MSL) equal to 6,905 Ac-Ft. and a maximum height of 15 feet. In accordance with the Corps of Engineers' guidelines, this dam is classified as intermediate in size based on storage criteria.

15. SUBJECT TERMS

Dams, Inspection, Dam Safety, Pawtuxet River Basin, Scituate, Rhode Island

16. SECURITY CLASSIFICATION OF:**a. REPORT**
UNCLASSIFIED**b. ABSTRACT**
UNCLASSIFIED**c. THIS PAGE**
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19a. NAME OF RESPONSIBLE PERSON
Matthew Connell**19b. TELEPHONE NUMBER (include area code)**
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MAGUIRE

Architects • Engineers • Planners

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October 3, 1980

Department of the Army New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Re: Inspection and Evaluation of Non-Federal Dams, FY-80
Connecticut and Rhode Island
Contract No. DACW33-80-C-0013

Attn: Mr. P. Gould

Gentlemen:

In accordance with paragraph 4, a, 2 d of Proposed Appendix "A" of the above referenced contract, we hereby submit the following letter which outlines our reclassification of Moswansicut Pond Dam (R.I. 03002) to a low hazard classification.

We trust the information provided is adequate for your staff to agree with our reclassification to low hazard for this dam. If you have any questions regarding the enclosed data, please contact the undersigned.

Very truly yours,

CE MAGUIRE, INC.



E. A. Reed, P.E.

EAR/jg

attachments: Inventory Forms (3)
Photographic Pages (7)
Location Map (1)
Reduced Dwgs.

1. DESCRIPTION OF THE PROJECT

- a. Location - Moswansicut Pond Dam is located on Moswansicut Brook within the Scituate Reservoir Watershed in the Towns of Scituate and Johnston, Providence County, Rhode Island, approximately 3,500 feet from the center of the village of North Scituate. Coordinates of the dam are approximately $41^{\circ} 50.5'$ N Latitude and $71^{\circ} 35'$ W Longitude. The dam impounds runoff from a drainage area of 3.9 square miles of moderately sloped terrain. The axis of the dam is oriented in a north-south alignment with the reservoir located to the east of the dam. Moswansicut Pond Dam flows into Moswansicut Brook which leads to the main body of the Scituate Reservoir located 4000 feet downstream.
- b. Description of Dam and Appurtenances - The dam at Moswansicut Pond is approximately 450 feet long, and is assumed to be a homogeneous earth embankment structure about 15 feet high. It is unknown if the embankment contains a corewall or cutoff. The embankment has slopes that vary, but are typically 2H on 1V for both upstream and downstream faces and has a crest width of 15 feet. The overflow spillway is an uncontrolled reinforced circular concrete drop inlet 12 feet in diameter. Spillway crests elevation is 304.20 feet NGVD. Discharges flow over the circular spillway crest dropping about 10 feet to a 5'6" W by 8'0" H arched conduit that carries

the flow through the embankment and downstream. (See Photo C-4). An emergency spillway is located north of the embankment approximately 1,500 feet and is controlled by a 42-inch diameter concrete culvert. This emergency spillway permits reservoir stages above elevation 305.7 feet (1.5 feet above the overflow spillway crest) to flow through a natural stream bed around the dam and downstream. The outlet works for the Pond is incorporated into the overflow spillway structure and is a rectangular opening, controlled by stop logs placed in guide channels in the sidewalls. Discharges flow through the spillway conduit to the downstream channel. (See Photo C-5).

c. Size Classification - Moswansicut Pond Dam has an impoundment capacity at the top of the dam (El. 309.3 MSL) equal to 6,905 Ac-Ft. and a maximum height of 15 feet. In accordance with the Corps of Engineers' guidelines, this dam is classified as Intermediate in size based on storage criteria.

d. Hazard Classification - The dam is classified as having a LOW hazard potential because its failure will not result in loss of life or appreciable property damage. Storage in this reservoir serves as a supplement to the water supply requirements of the main Scituate Reservoir. Of 5,466 Ac-Ft. of available storage in Moswansicut Pond

below the spillway crest (El. 304.20 MSL), only 2,195 Ac-Ft. is available to be diverted to Scituate Reservoir through the lowest outlet control. The remainder is dead storage. This 2,195 Ac-Ft. of storage represents only 2 percent of the total storage in Scituate Reservoir.

Estimated downstream water depths due to a possible total dam failure discharge of 8600 c.f.s. may range from 8.0 feet \pm immediately downstream of Moswansicut Pond Dam to 4.0 feet at a distance of 2,000 feet from the dam where it joins the Scituate Reservoir. The depths of flow downstream from the dam before and after dam failure are 3.0 and 8.0 feet for respective discharges of 800 CFS and 8600 CFS. The increase in depth of flow due to the failure of the dam is 5.0 feet. The estimated rise in water surface elevation in Scituate Reservoir due to failure of Moswansicut Pond Dam is less than 1.0 foot. The dam failure discharge may damage West Greenville Road (Route 116), Hartford Pike (Route 101), and temporarily disrupt the utility service adjacent to these roadways.

- e. Ownership - Moswansicut Pond Dam is owned by the City of Providence and is operated and maintained by the Providence Water Supply Board.

- f. Operation - Operating personnel are under the direction of:

Chief Engineer

Providence Water Supply Board

552 Academy Avenue

Providence, RI 02908

- g. Design and Construction History - The original Moswansicut Pond Dam was constructed prior to the early 1900's. In 1919, the City of Providence acquired possession of the Pond from the North Scituate Cotton Mills and raised the crest of the existing dam to its present elevation. At the same time, the outlet structure was replaced with the concrete circular drop inlet spillway. This construction and other miscellaneous work was completed by George T. Seabury, Inc., of Providence. No record of subsequent repairs or improvements to the dam, since that time, exists.

- i. Normal Operating Procedures - Moswansicut Pond is operated by the staff of the Providence Water Supply Board as a supplemental supply to the main Scituate Reservoir system. Normally, the outlet works remains closed throughout the year and all flows from the impoundment are the result of discharges over the spillway crest. The stop logs of the outlet works would be removed during an extended drought period to supplement the main supply,

to lower the pond level for maintenance or improvements, or to relieve excessive loading against the embankment caused by intense rainfall. Water surface levels are measured and recorded weekly, and the dam is visited daily for spot inspections.

2. HYDROLOGY

- a. Test Flood Analysis - Recommended guidelines for the safety inspection of dams by the Corps of Engineers were used for the selection of the "test flood". As a low hazard and intermediate sized dam, the test flood magnitude ranges from a storm event equal to a 100-year frequency to one-half the Probable Maximum Flood (PMF). For a drainage area of 3.9 square miles that contains 0.78 square miles or (20 percent) swamps or natural storages and has basin slopes equal to 0.02 feet/feet a test flood equal to $\frac{1}{2}$ PMF was calculated to be 400 CSM or 1,560 CFS. The routed outflow discharge of 1500 CFS was developed for the calculated inflow 1560 CFS. The outflow discharge was calculated on the assumption that the outlet works was closed and the dam has a uniform crest elevation of 309.30 NGVD.

The spillway capacity is hydraulically inadequate to pass the "test flood" and the dam would be overtopped by approximately 1.0 foot. The maximum outflow capacity of the spillway, under stillwater conditions, without over-

topping of the dam is 800 CFS, which is equal to 53 percent of the outflow discharge. Overtopping potentials for lesser storm events have been calculated and are tabulated at the end of this text.

At the spillway crest elevation (304.2), it will require 4.2 hours to lower the reservoir level by one foot. One foot of depth in the reservoir at the spillway crest level can accommodate approximately 1.35 inches of effective rainfall.

- b. Dam Failure Analysis - Assuming the reservoir water surface level is at the top of the dam, the dam failure discharge is calculated to be equal to 8,600 CFS. This failure discharge on an instantaneous full depth partial width breach of 80 feet wide (20% length of dam) located to the left of the spillway and is in accordance with visual inspection and topographic site conditions. The discharge from the outlet structure is excluded from the total failure discharge computations assuming them to be insignificant and/or inoperable at the time of failure. This discharge will raise the water surface, immediately downstream of the dam, approximately 5.0 feet above the depth just prior to failure when the spillway discharge is 800 CFS and the depth is 3.0 feet. At a distance 2000 feet downstream, at the junction of the downstream chan-

nel with the main body of water of the Scituate Reservoir, the depth of flow in the channel will decrease from 8.0 to 4.0 feet. The water surface elevation in Scituate Reservoir should increase less than 1.0 foot from the failure flow.

MOSWANSICUT POND DAM

Inflow, Outflow, and Surge Data

FLOOD	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* RUNOFF IN INCHES	MAXIMUM INFLOW IN C.F.S.	MAXIMUM** OUTFLOW IN C.F.S.	SURCHARGE HEIGHT IN FEET	SURCHARGE STORAGE ELEVATION
½ MPF	11.9	9.5	1,560	1,500	6.00	310.20

= Test Flood

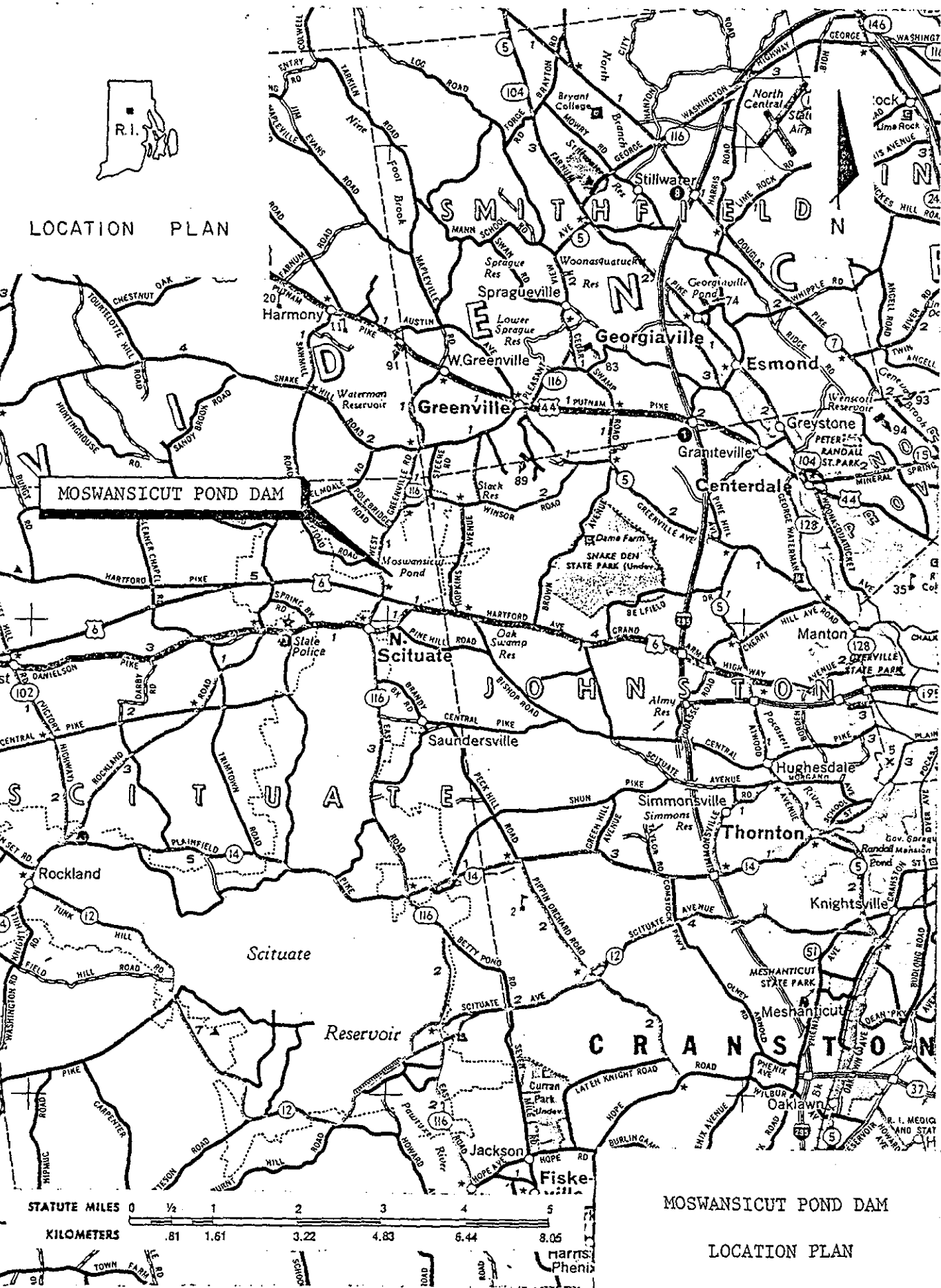
*Infiltration assumed as 0.1"/hour
 **Lake assumed initially full at spillway crest elevation 304.20
 (top of dam = 309.30)

NOTES:

1. "Test Flood" computation based on COE guidelines.
2. Maximum capacity of spillway without overtopping the top of the dam elevation (309.30) is equal to 800 C.F.S.
3. Surge storage is assumed to overtop the dam when exceeding the spillway capacity.
4. Test flood = one-half PMF = 400 CSM = 1,560 CFS
 (D.A. = 3.90 square miles).

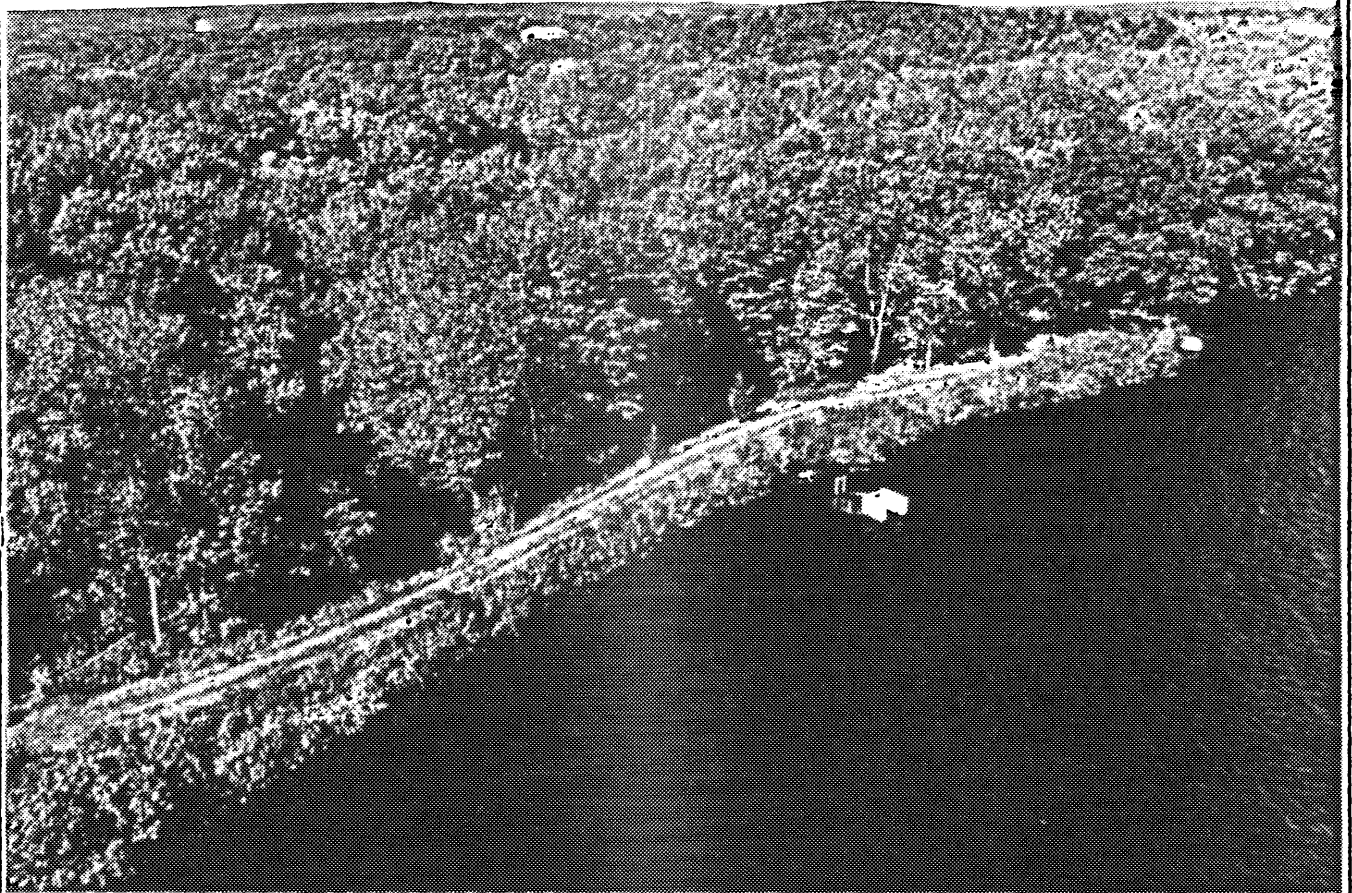


LOCATION PLAN



MOSWANSICUT POND DAM

LOCATION PLAN



OVERVIEW PHOTO MOSWANSICUT POND DAM



PHOTO C-1 UPSTREAM FACE OF DAM LOOKING TOWARD RIGHT ABUTMENT

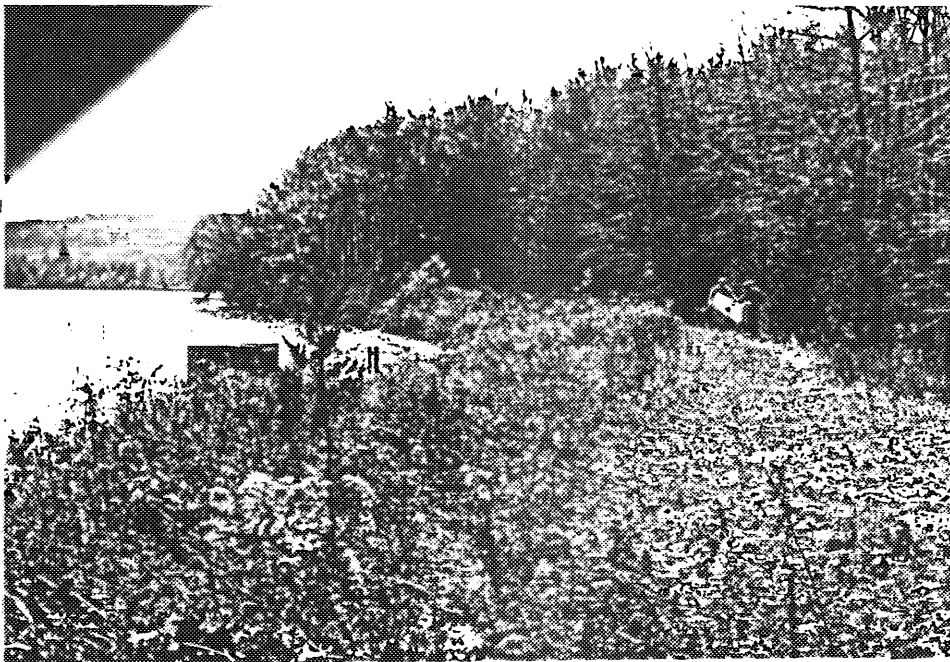


PHOTO C-2 UPSTREAM FACE AND CREST OF DAM LOOKING TOWARD LEFT ABUTMENT

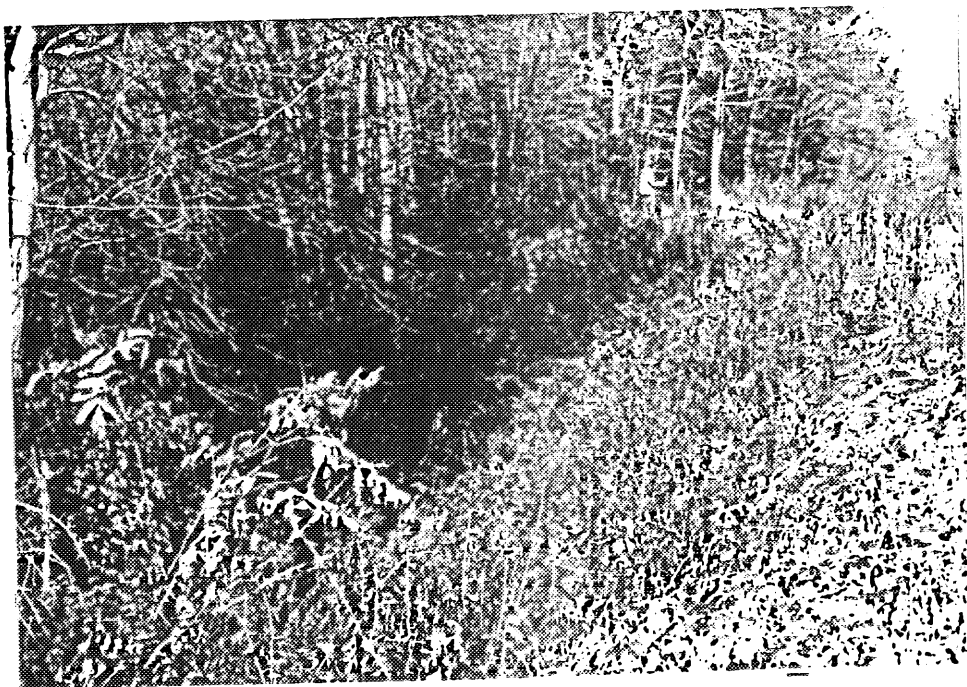


PHOTO C-3 DOWNSTREAM SLOPE OF DAM LOOKING FROM LEFT ABUTMENT

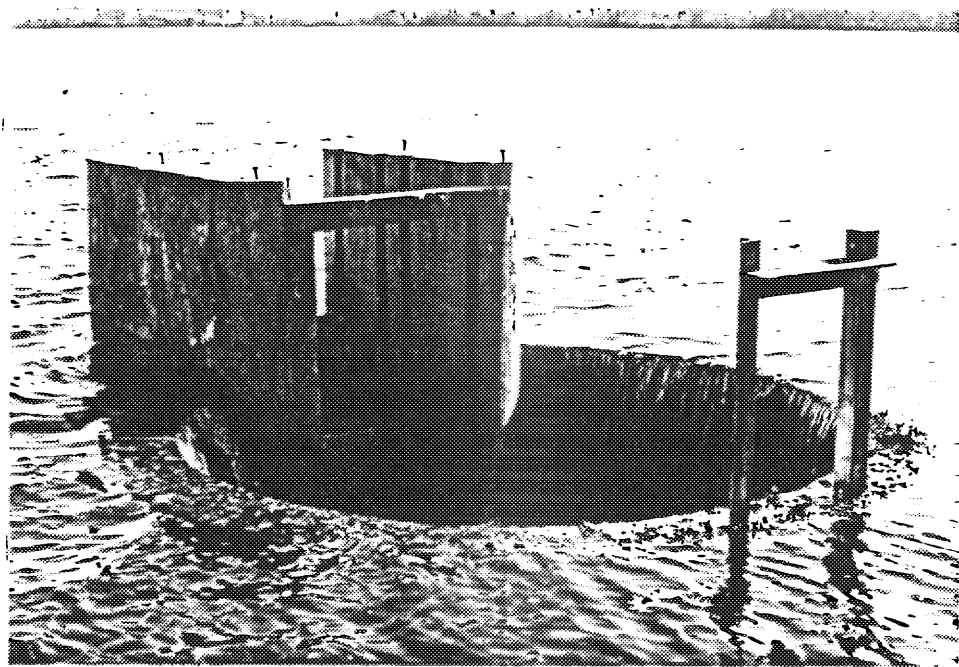


PHOTO C-4 OVERFLOW DROP INLET SPILLWAY (STRUCTURE ALSO CONTAINS STOPLOG CONTROLLED OUTLET WORKS).

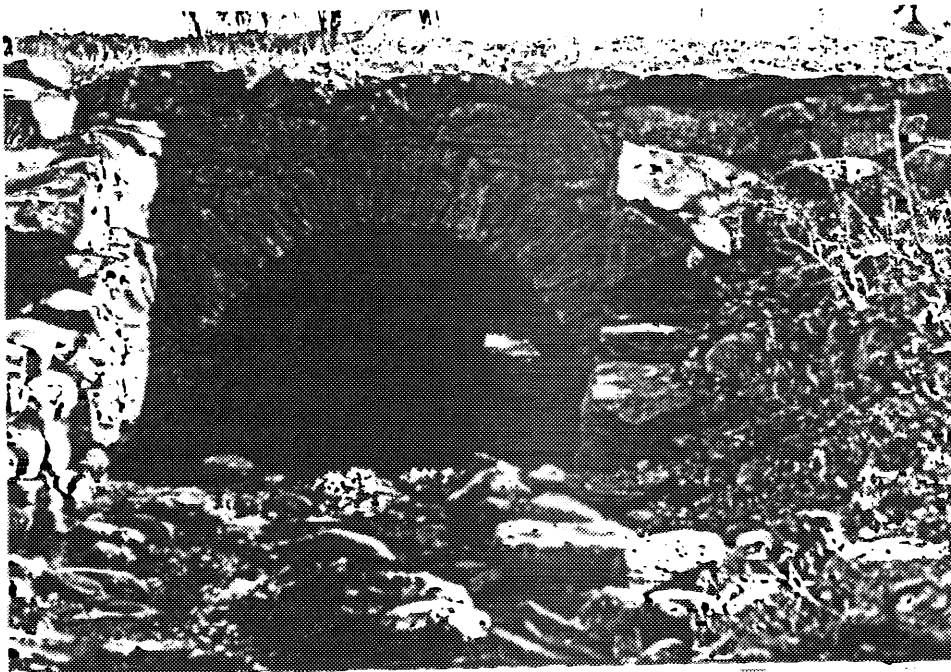


PHOTO C-5 OUTLET CONDUIT THROUGH DAM FOR SPILLWAY
STRUCTURE



PHOTO C-6 EMERGENCY OVERFLOW SPILLWAY NORTH OF MAIN DAM



PHOTO C-7 APPROACH CHANNEL FOR EMERGENCY SPILLWAY



PHOTO C-8 DOWNSTREAM CHANNEL

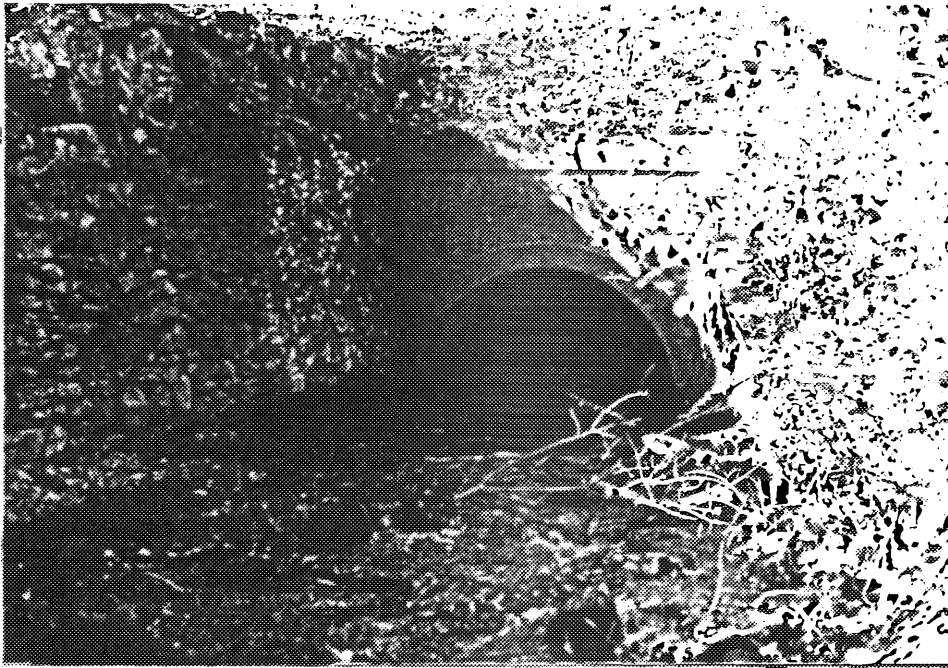


PHOTO C-9 HIGHWAY CULVERT UNDER ROUTE 116

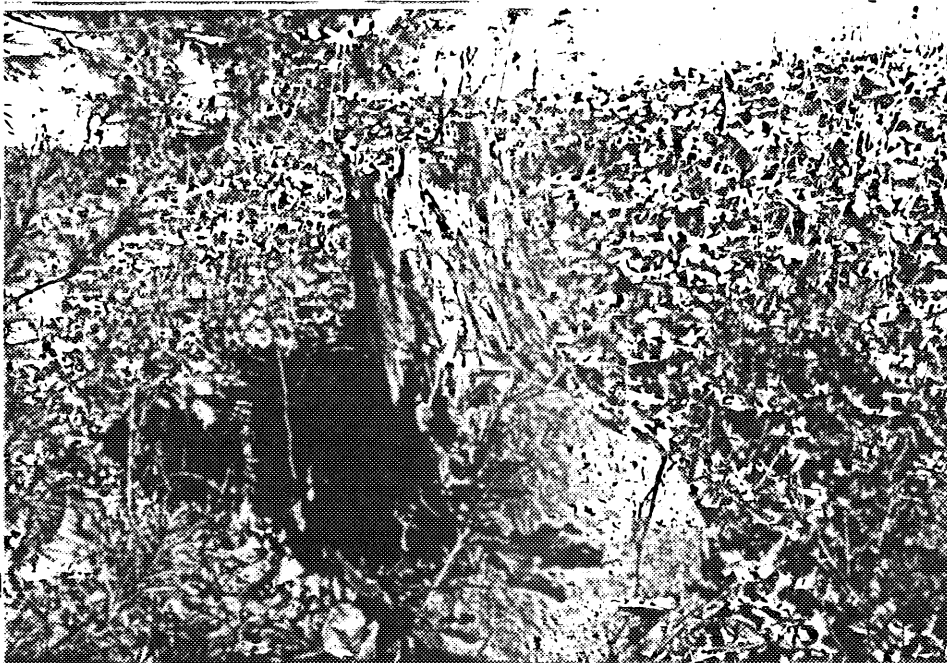
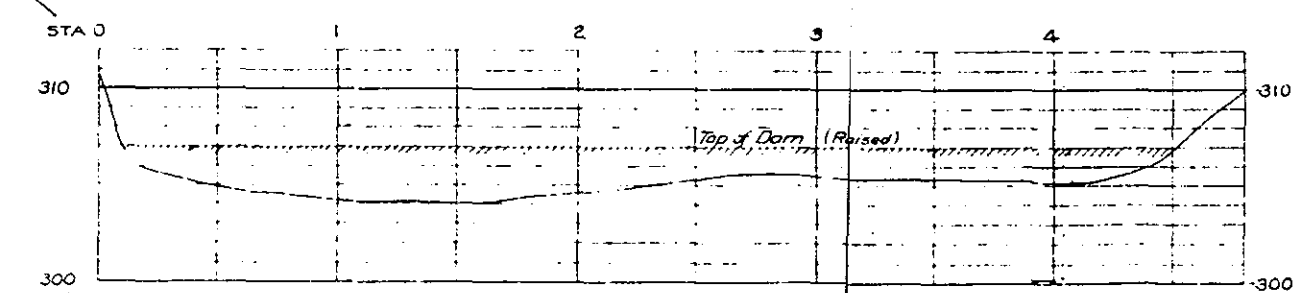
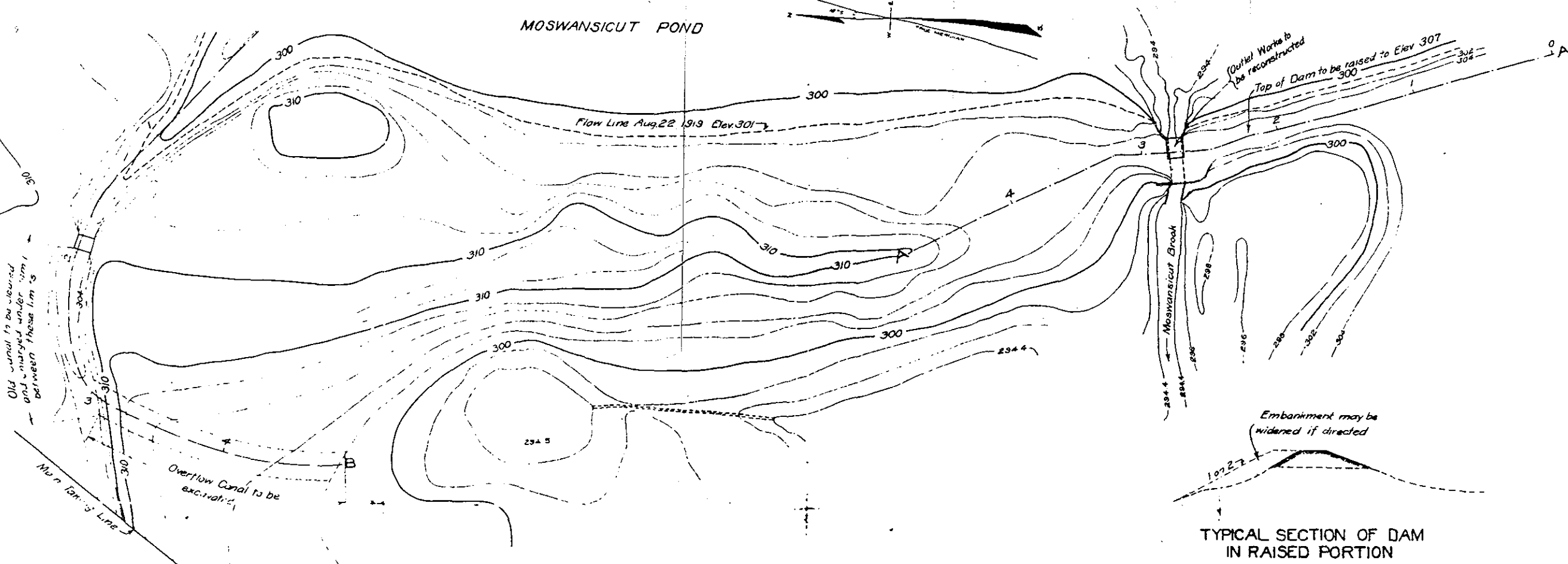


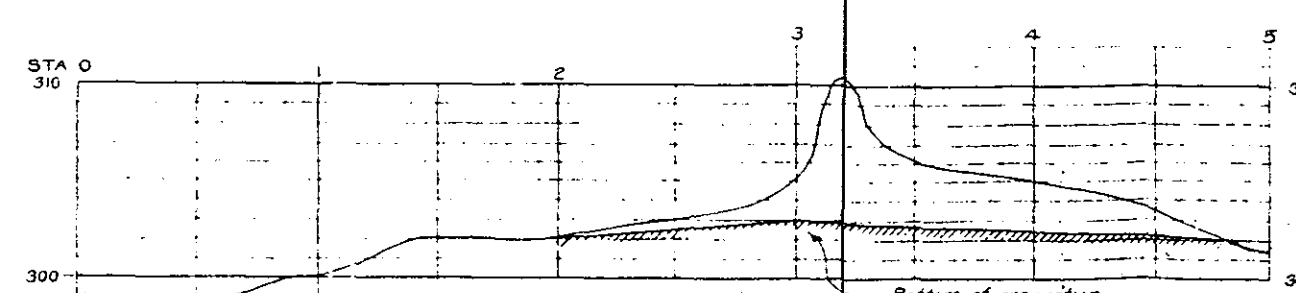
PHOTO C-10 ROTTING TREE STUMP ON DOWNSTREAM SLOPE



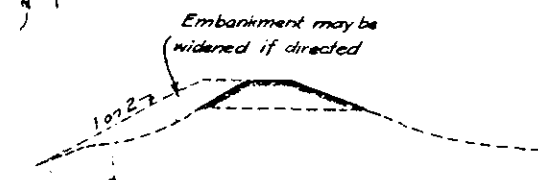
PHOTO C-11 SEEPAGE AT DOWNSTREAM TOE NEAR LEFT ABUTMENT



PROFILE OF TOP OF DAM A-A



PROFILE ON E OF OVERFLOW CANAL B-B



TYPICAL SECTION OF DAM
IN RAISED PORTION



SECTION OF OVERFLOW CANAL
AT STA. 2+50

CITY OF PROVIDENCE
WATER SUPPLY BOARD

PHOTO REDUCED
NOT TO SCALE

PLAN

SECTION ON C OF CULVERT

PART SECTION C-C

PLAN

PART SECTION E-E

SECTION A-A

PART SECTION D-D

NOTE
All filling and embankment around the outlet culvert and weir shall be thoroughly compacted by rolling with approved rollers in 6 inch layers by running with extra heavy tampers or for the gravelly portions, by the liberal use of water. An impervious layer of soil nowhere less than 3 feet thick shall be placed as a blanket near the up stream face, fully covering all disturbed areas and protected by at least 3 feet of gravelly material. Sufficient of the old rubble walls shall be left down to make this blanket effective and all spaces around walls left standing shall be removed full of earth. Present legal flow line (Flow 3016) is not being changed by new construction. During the construction of the weir and culvert the pond will be drained off as low as the existing outlet works will admit.

CITY OF PROVIDENCE
WATER SUPPLY BOARD
SCITUATE RESERVOIR
OUTLET WORKS AT MOSWANSICUT POND
DETAILS OF WEIR AND CULVERT

SEPT 1911

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NOT TO SCALE

FILE: Cont 12 2 3425

J.B. Marsh
Designing Engineer

Frank E. Winsor
Chief Engineer

